

Intro to Node Red

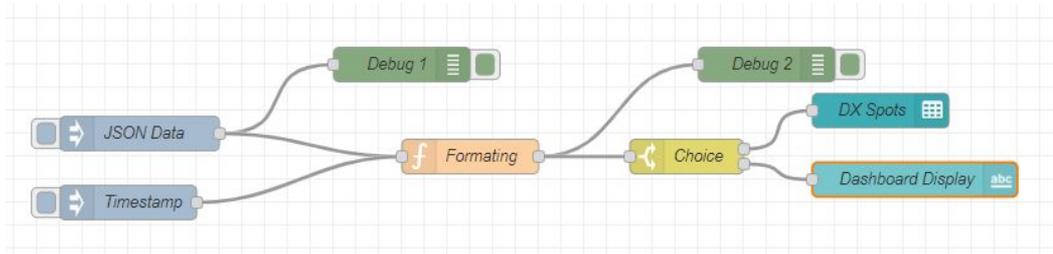
Build a Custom Dashboard & Control Web Page For
Your Shack for DXing & Contesting

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www.aaøz.com



What is Node Red

- Developed by IBM in 2013 - version 3.1 is the latest as of this presentation
- Built on Node.JS (javascript) and open source for the IoT world
- Programming & dashboard viewing is web browser based
- Server runs on basically anything, Windows, Mac, Linux, Raspberry Pi, etc.
- Hides all the high level “boilerplate” code to allow quick programming





But...I'm Not A Programmer!

- If I can program in Node Red, you can program in Node Red!
- You just need logic and common sense skills
 - What is the end goal? What major tasks do I need to accomplish?
 - If A and B are equal do C.
 - I have A, but I need to get B, what steps are necessary to obtain B?
 - I am seeing A but I need B, how can I change or get the data I need?
- Pre-programmed nodes do all the heavy lifting
- Many “ready to go” flows are ready for importing
- If you get stuck, there are many resources available on the net
- Debug nodes are your best friend





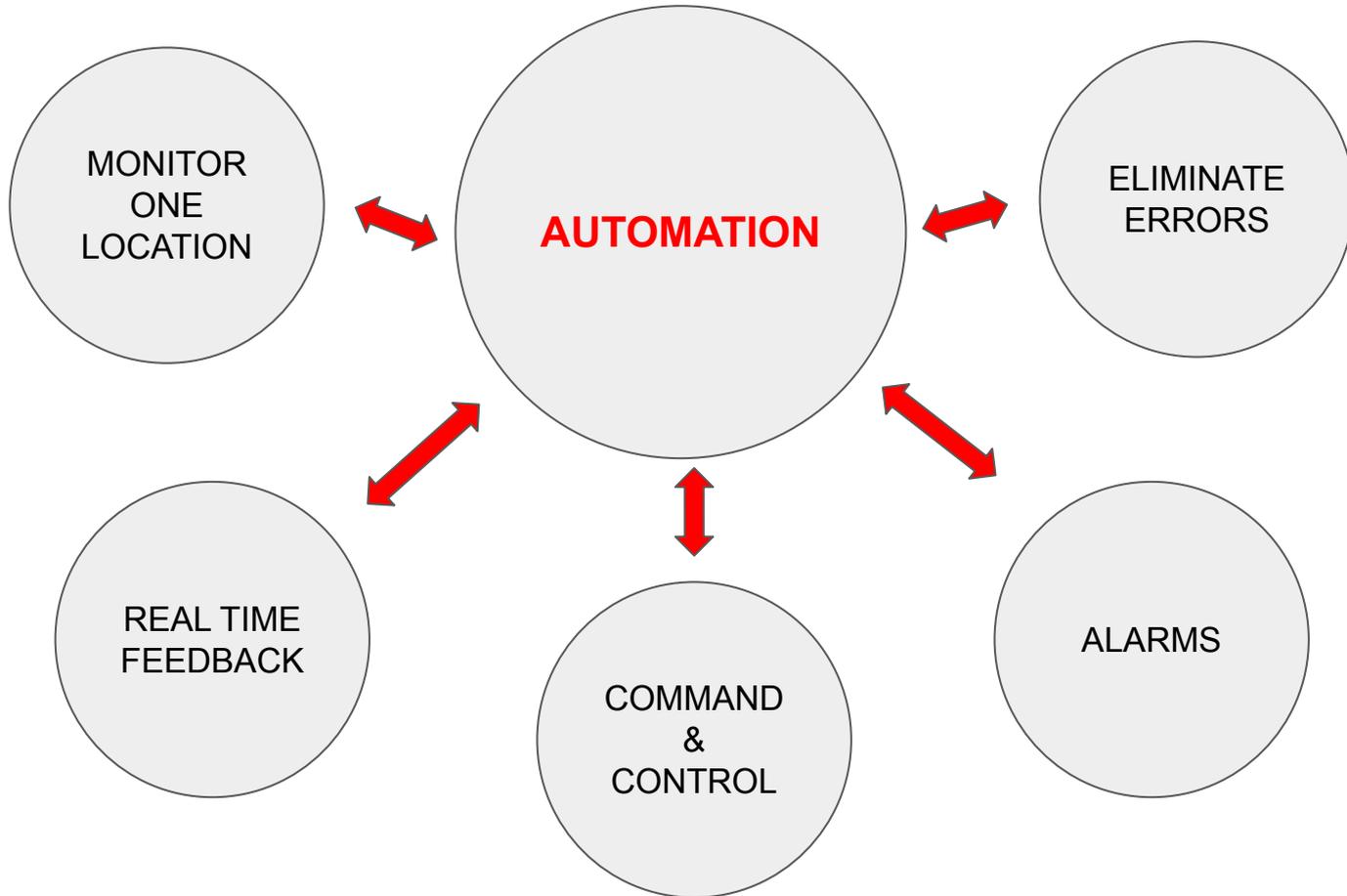
What Can Node Red Control?

- Almost anything with an input or output (Ethernet, Serial, USB, etc)
- Most radios with Hamlib (seamless Flex 6000 radio integration)
- Amplifiers
- Tuners
- Rotors
- Antenna switches
- Relays
- Antenna disconnects
- Power supplies
- Home automation devices
- Weather stations





Why Use Node Red?





How Does This All Work?

- Load Node Red on a computer, preferably a Raspberry Pi running 24/7
- Configure nodes and connect them together for the basic logic
- Configure the dashboard to display the logic you just programmed or import a flow for your device from the ham radio for Node Red repository
- Build more flows as you gain more experience
- Give back to the community
 - Build a node for a new piece of equipment
 - Share your flows
 - Answer questions on a mailing list
 - Promote the hobby while using Node Red





How Does This All Connect?

Power



Radio



Amp



Tuner



Coax Disconnect



Ant Switch



ETH ***** 217

SER

USB

SER

PWR

USB

NODE RED FLOWS - USB, Serial or Ethernet Input/Output

RLY

ETH

ETH

ETH

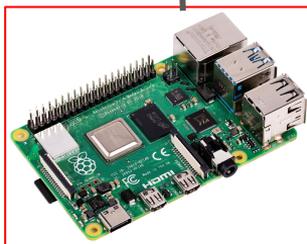
USB



Band Pass Filters



RS-232 to Ethernet Converter



Raspberry Pi 4



IP Relay Modules

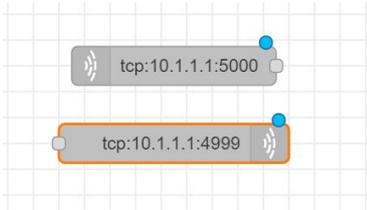
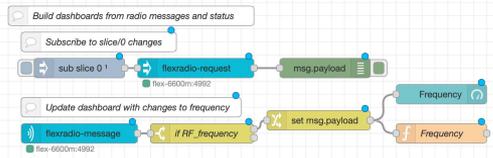
Rotator



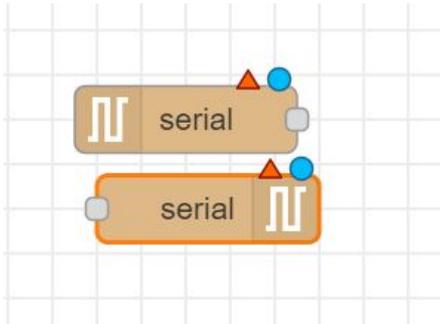


Radio Connection Examples

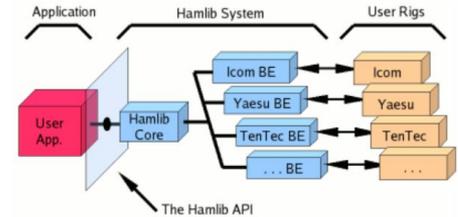
TCP/IP



Serial

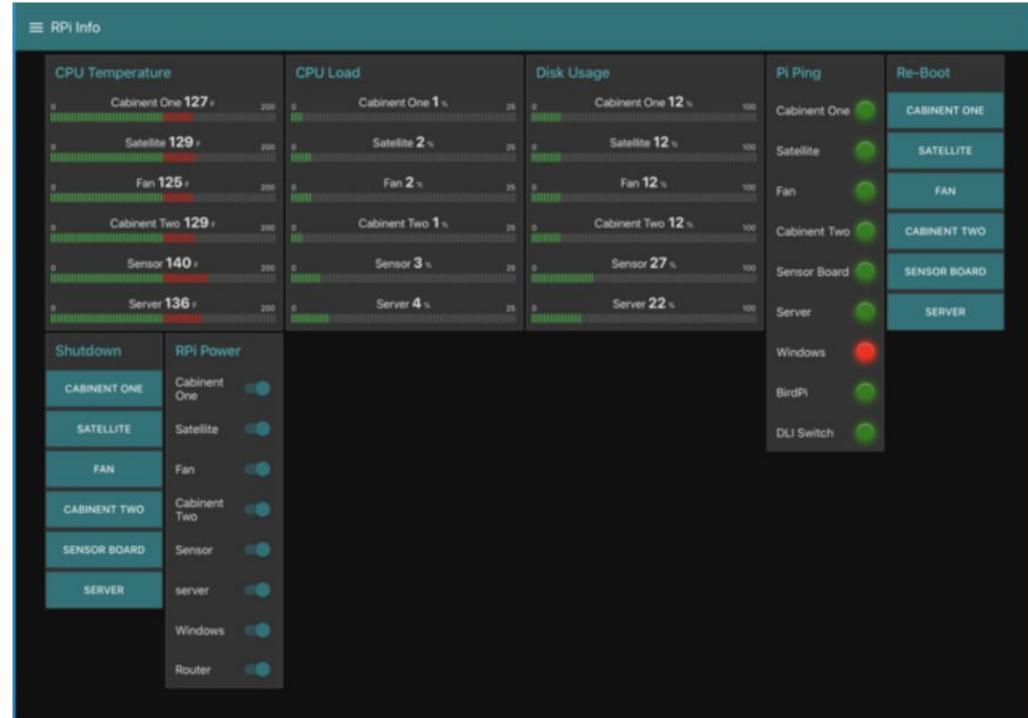
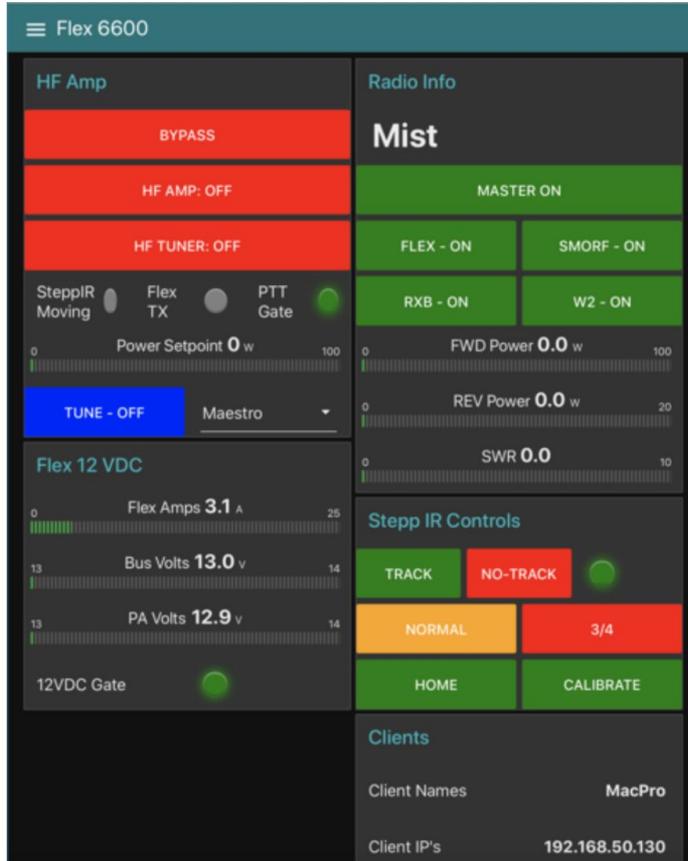


HamLib





Node Red Dashboard Examples





Node Red Dashboard Examples

Station Control 6/20/2022, 7:12:03 PM > 10 Miles 23:12 UTC

Vertical
SteppIR Frequency 7.070
Slice Frequency 7.074
MANUAL SYNC MANUAL TRACK
TX A B C D
Band Select option - +
NORMAL ON 3/4 OFF
SDA-100 TRACK ON
RETRACT CALIBRATE

Yagi
SteppIR Frequency 14.225
Slice Frequency 14.074
MANUAL SYNC MANUAL TRACK
TX A B C D
Band Select option - +
NORMAL ON BI DIR OFF 180 OFF
SDA-2000 TRACK ON
RETRACT CALIBRATE

Power Genius XL
PG-XL OPERATE
TG Peak Out 0 W
Flex PWD Power 0 W
RF Setpoint
Flex DC Control
MASTER DC
FLEX - ON PG-XL ON
TG-XL ON AG - ON
12VDC PS 12VDC Gate

Antenna Genius
40M ANT X X ANT 20M
40M ONE X X TWO 20M
VERTICAL VERTICAL
YAGI YAGI
DIPOLE DIPOLE
DUMMY DUMMY
Flex Amps 2.5 A
Bus Volts 13.8 V
Flex PA Volts 13.5 V
Fan RPM PG-XL PA Temp
PG-XL HL Temp

Tuner Genius
C1 L C2
ANT ONE ANT TWO
BYPASS OFF OPERATE
Amp 0.0 SWR
Tuner 0.0 SWR
Flex 0.0 SWR
TG-XL TUNE
FLEX TUNE
VFO Lock A B C D
OSO Info
F5PIO-NEW
JOL

VA3MW Dashboard

VA3MW Shack Control

Control
Case Fan
6700 PWR
6600 PWR
6600 PTT 6700 PTT
Astron 70A
WIN 10 PWR
40M Beam
110 VAC
220V AC
12v ACC PWR
6600 Client 192.168.110.123
6500 Client

RF Info
TX / RX
PGXL RF 0 Watts
SWR 0
HI PWR SCAN
PORT 1 PORT 2
Case Temp 29.2 C
Amp Tray 27.6 C
Boathouse Temp 28.0 C
Outside 24.5 C

Rotator
Rotator Data
Heading 277
EU - 50 SA - 150
US - 200 VK - 300
HDG 270
N1MM cmd

Steppir
Steppir Data
Motor Ready
Direction Norm
NORMAL 180
DIR DRV REF
SteppIR 50300
6600 Freq 50313.00
TX Power 100
40M NE
40M SW



Node Red Dashboard Examples

The top screenshot shows a Node Red dashboard titled "WO2X Shack Control" with the following sections:

- Flex Radio:** Radio Model (Flex Radio 6600M), Radio Callsign (WO2X), Client Names (DESKTOP-IQBGQT7), Client IPs (10.0.0.119), TX VFO (14.210000), Mode (USB), RF Power (47), Tune Power (21), Flex TX (READY).
- Power Genius XL:** Status (IDLE), PGXL FWD 2 w, PG XL SWR 1.00, PA Temperature 37 c, Harmonic Load 31 c, VAC (243), VDD (0.0), ID peak (0), Fan Speed, Band A (20), Band B (0 b).
- Tuner Genius:** Status (OPERATE), TG XL Peak Output 0 watts, TG XL SWR 1.00, C1, L, C2, RADIO 1, RADIO 2, TUNE, Tuning Status (READY), Frequency A (14.210), Frequency B (0.000), MIC In (-22 db), MIC PK.
- Antenna Genius:** Radio Antenna 1 (20m), Radio Antenna 2 (None), 5 B YAGI, 30/6 DIPOL, 30/6 DIPOL, GSRV, GSRV, Flex Meters (Input voltage: 14.4, PA Voltage: 14.2, 6600M Fan Speed: 1080, PA Temp: 30.3), MIC PK.
- Beam:** HEADING 280, MANUAL, a world map with a beam direction indicator.
- Rotor & Power Switch:** 0 NORTH, 50 EU, 120 AF, 160 CARIB, 210 SO PAC, 240 ZL, 280 HI, 330 JA, STOP, CALLSIGN, LOG CONTACT.
- Hosts Pings:** Flex 6600m (0.119 ms), PC (0.198 ms), RaspI (0.083 ms), Internet (11.6 ms), Flex (green), RaspI (green), PC (green), Internet (green).

The bottom screenshot shows the FlexRadio software interface with the following details:

- File Settings Profiles Help
- FlexRadio logo
- PC Audio controls
- TX | P/CW | PHNE | RX | EQ | AMP
- Frequency display: 14.210.000 A TX +8dB
- Power Genius XL status: Fwd Pwr (1.5k), SWR (2.5), Temp (80), RF Pwr (100)
- STATION: DESKTOP-IQBGQT7
- Pequanock, NJ v3.3.4.3727 (develop)
- AMP OPERATE TX Ready 09/03/21 19:22:33Z



Node Red Dashboard Examples

W7GES Shack Control

<p>Power Switch</p> <p>Astron 50A</p> <p>Astron 30A</p> <p>Thetis Computer</p> <p>Geochron</p> <p>Shack Computer</p> <p>403A PGXL</p> <p>Alpha 9500</p> <p>Outside Light</p> <p>Tower Switch</p> <p>Rotor Power Supply</p> <p>Ethernet Fiber</p> <p>Unifi AP East</p> <p>Outlet 4</p> <p>Outlet 5</p> <p>Outlet 6</p> <p>Outlet 7</p> <p>Outlet 8</p>	<p>Anan 7000</p> <p>VFO-A</p> <p>VFO-A Mode</p> <p>VFO-B</p> <p>VFO-B Mode</p> <p>Split</p> <p>Pure Signal</p> <p>Anan 7000 TCP Status</p> <p>Anan 7000 TCP Msg</p> <p>MOAS II Anan 7000</p>	<p>Rotator Genius</p> <p>TOP ANTENNA:</p> <p>BOTTOM ANTENNA:</p> <p>135 SA, 110 CARIB, 75 AF, 45 S EUR, 30 N EUR, 315 JA, 275 VK, 230 ZL</p> <p>STOP</p> <p>Set heading 0, Set heading2 0</p>	<p>TS-890</p> <p>VFO-A</p> <p>VFO-A Mode</p> <p>VFO-B</p> <p>VFO-B Mode</p> <p>Split</p> <p>N1MM BandScope</p> <p>TCP TS-890 Status</p> <p>TS-890 TCP Msg</p> <p>MOAS II TS-890</p>	<p>Alpha-9500</p> <p>POWER</p> <p>FWD Power</p> <p>SWR</p> <p>Grid Current mA</p> <p>Plate Current Amps</p> <p>Plate Voltage kV</p> <p>Status</p> <p>N1MM Freq</p> <p>Amp Band</p> <p>Power Genius XL</p> <p>PGXL FWD w</p> <p>PG XL SWR swr</p> <p>PA Temperature c</p> <p>Harmonic Load c</p> <p>VAC</p> <p>VDD</p> <p>Band A</p> <p>Band B</p>
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Node Red Dashboard Examples

Dynamic DX Cluster Spots or QSO Map in Real Time

☰ RBN Spots ⚡ > 10 Km No Active Contest SFI 94 A 10 K 2 8/1/22, 12:26 UTC

All Skimmer Spots with Dups

Freq	Call	Comment	Time
14011.0	R1IKD	CW 9 dB 28 WPM CQ	1226Z
10121.0	GMDKET	CW 5 dB 20 WPM CQ	1226Z
14012.6	UA1ATD/P	CW 35 dB 31 WPM CQ	1226Z
18074.1	G0SWU	CW 27 dB 16 WPM CQ	1226Z
18089.3	DL7DAX/P	CW 7 dB 30 WPM CQ	1226Z
14019.3	OK1PL	CW 38 dB 23 WPM CQ	1226Z
14019.3	OK1PL	CW 6 dB 22 WPM CQ	1226Z
14019.2	OK1PL	CW 26 dB 23 WPM CQ	1226Z
14019.3	OK1PL	CW 13 dB 23 WPM CQ	1226Z
7055.6	WDSHR	CW 10 dB 18 WPM CQ	1226Z
14019.3	OK1PL	CW 27 dB 22 WPM CQ	1226Z
7032.0	KA1FXK	CW 25 dB 21 WPM CQ	1226Z
14019.3	OK1PL	CW 12 dB 22 WPM CQ	1226Z
7055.6	WDSHR	CW 13 dB 18 WPM CQ	1226Z
14019.3	OK1PL	CW 11 dB 23 WPM CQ	1226Z
10121.0	GMDKET	CW 8 dB 20 WPM CQ	1226Z
14019.3	OK1PL	CW 14 dB 23 WPM CQ	1226Z
14028.4	RV9CVA	CW 9 dB 25 WPM CQ	1226Z
14028.3	RV9CVA	CW 14 dB 25 WPM CQ	1226Z
14074.0	JKTUKM	FT8 THANKS	1226Z
14019.3	OK1PL	CW 30 dB 22 WPM CQ	1226Z
7059.0	AAOZ	CW 17 dB 18 WPM CQ	1226Z
18074.0	G0SWU	CW 9 dB 16 WPM CQ	1226Z
10121.1	GMDKET	CW 30 dB 21 WPM CQ	1226Z

Contest Call RBN Spots Map

Band Pin Color

- 2M
- 8M
- 10M
- 15M
- 20M
- 40M
- 80M
- 160M
- Else

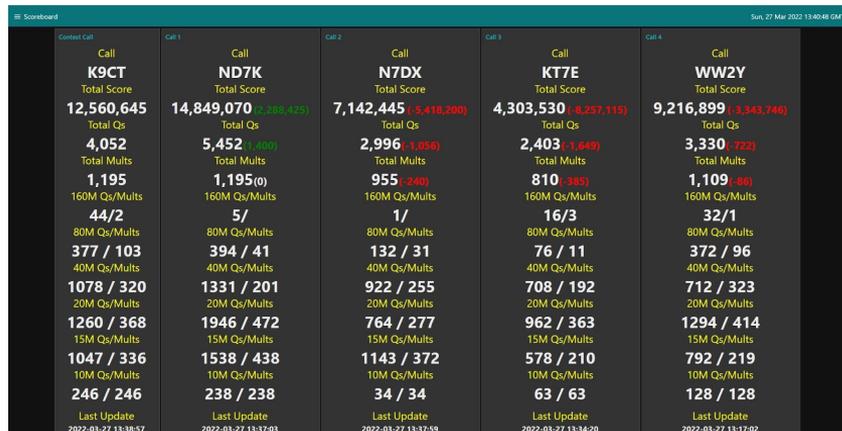
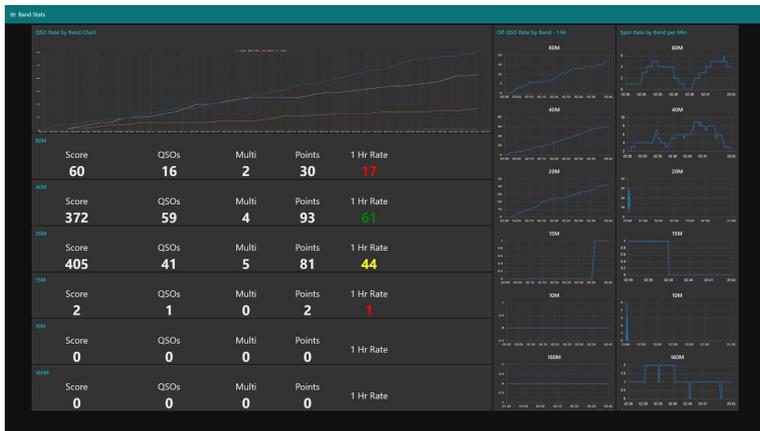
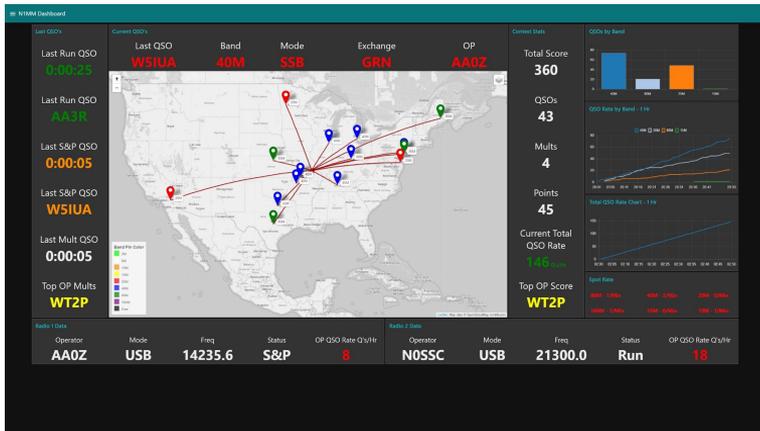
Skimmer Spots with Contest Call

DE	Freq	Call	Comment	Time
WB6BEE	7059.0	AAOZ	CW 17 dB 18 WPM CQ	1226Z
K9TM	7059.0	AAOZ	CW 15 dB 18 WPM CQ	1226Z
VEGWZ	7059.0	AAOZ	CW 18 dB 18 WPM CQ	1226Z
W3UA	7109.0	AAOZ	CW 8 dB 18 WPM CQ	1226Z
W3UA	7109.0	AAOZ	CW 8 dB 18 WPM CQ	1226Z
W4AX	7059.0	AAOZ	CW 11 dB 18 WPM CQ	1226Z
KM3T	7059.0	AAOZ	CW 22 dB 18 WPM CQ	1226Z
W6YX	7059.0	AAOZ	CW 27 dB 18 WPM CQ	1226Z
WBWVW	7059.0	AAOZ	CW 41 dB 18 WPM CQ	1226Z
Z14YL	7059.0	AAOZ	CW 15 dB 18 WPM CQ	1226Z
NAZR	7059.0	AAOZ	CW 13 dB 18 WPM CQ	1226Z
WC2L	7059.0	AAOZ	CW 11 dB 18 WPM CQ	1226Z
KP2RLM	14060.0	AAOZ	CW 16 dB 18 WPM CQ	1204Z

WITH DUPS CONNECT SKIMMERDISCONNECT SKIMMERCLEAR 160MCLEAR 80MCLEAR 40MCLEAR 20MCLEAR 15MCLEAR 10M



Node Red Dashboard Examples



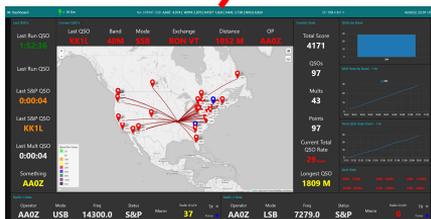


Future Real Time Contest Viewing

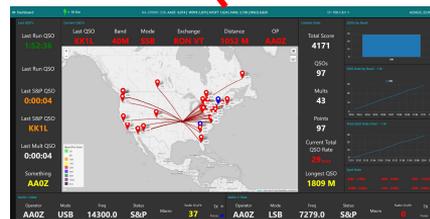
Master Database Website



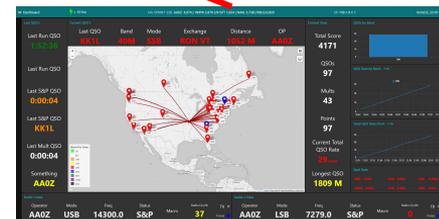
K9CT



K3LR



W3LPL

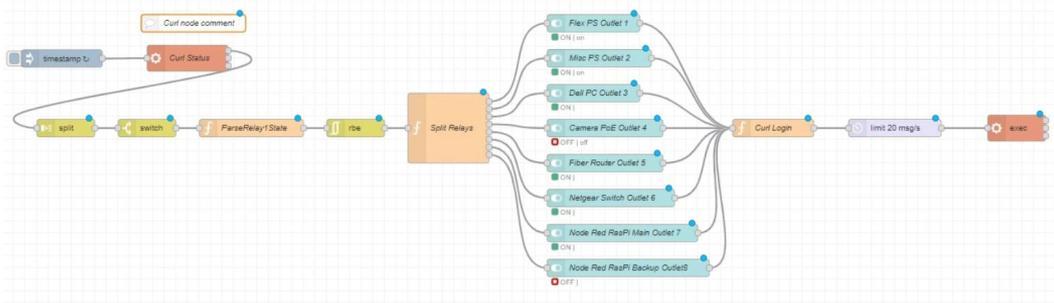


N0AX



Node Red Dashboard Examples

Digital Loggers Web Power Switch (8 Ethernet controlled A/C plugs)



Found on Amazon or Digital Loggers website for around \$180



Ping / Reboot built in this device

Power Switch Misc	Flex Power
Dell PC	Flex PS
Fiber Router	Misc PS
Netgear Switch	
RasPi (main)	
RasPi (backup)	
Camera PoE	

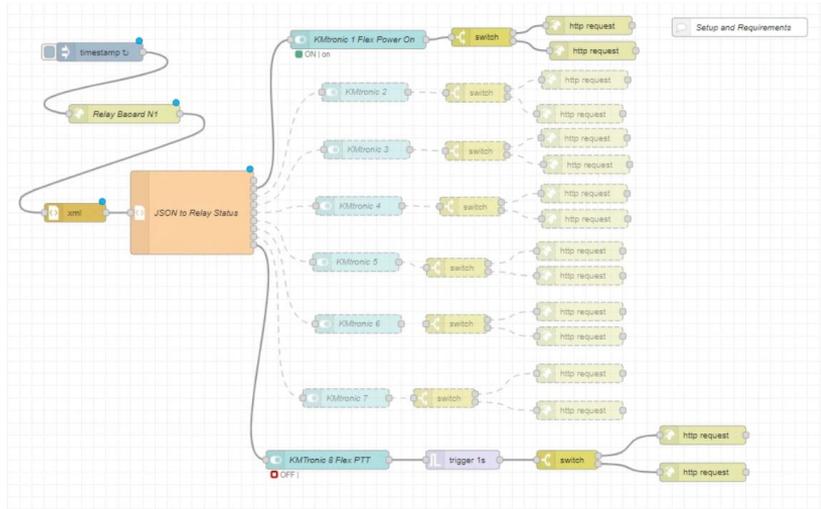


Node Red Dashboard Examples

KMTronics Web Relay (8 port Ethernet controlled relay)



Found on the
KMtronics website
for around \$90



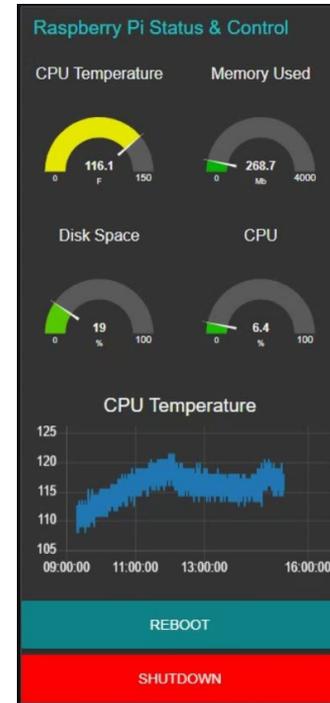
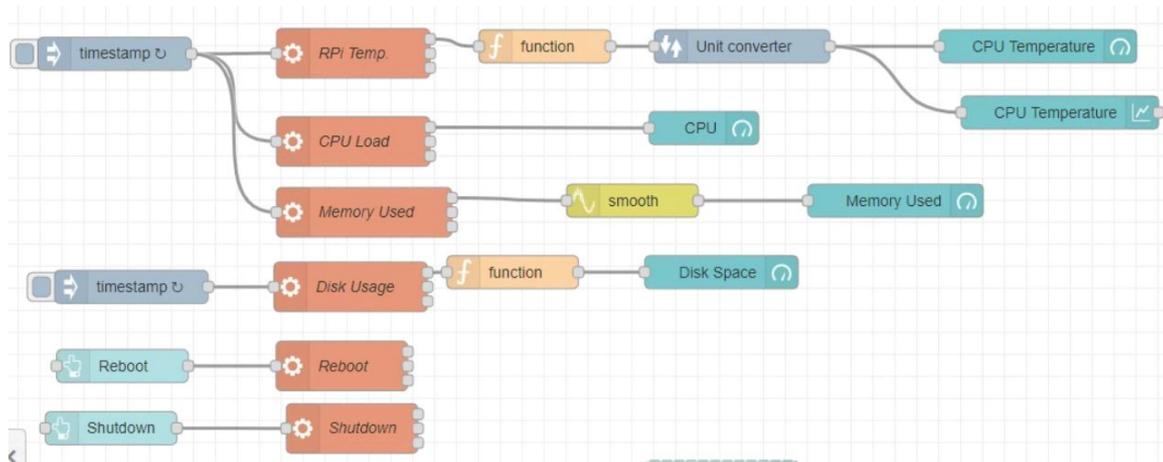
Runs on 12V





Node Red Dashboard Examples

Raspberry Pi Monitor with Dashboard



Many Node Red users have flows to monitor the WAN port via PING. If the internet goes down, reboot the router.



Tools to Automate Your Shack

Elgato Stream Deck



6 button - \$80

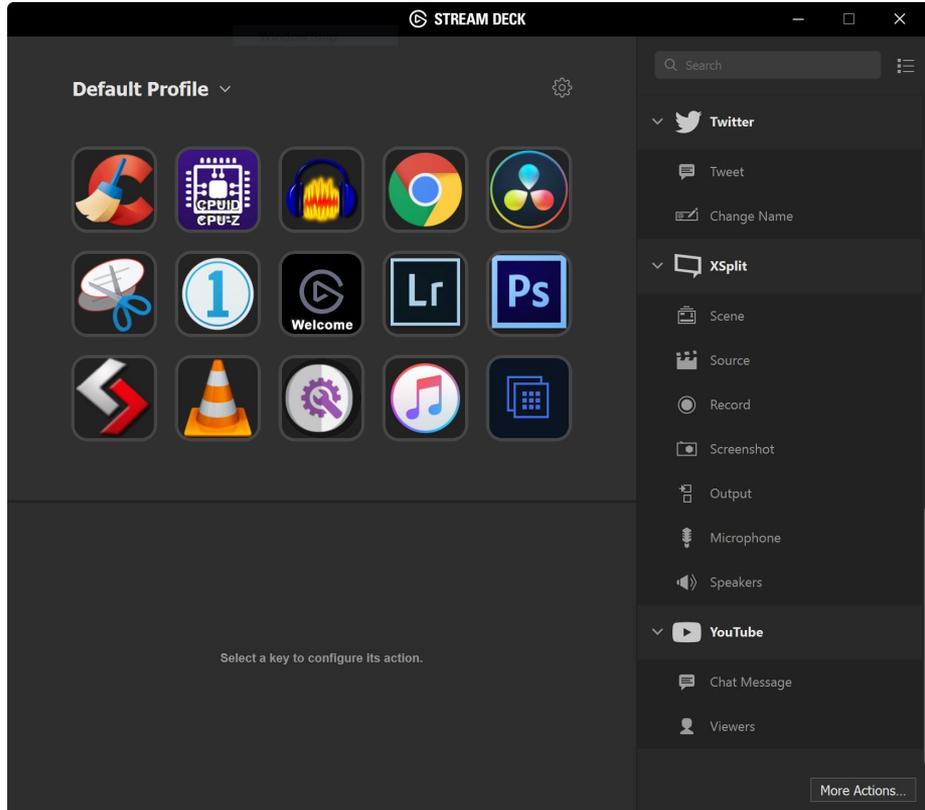
15 button - \$150

24 button - \$250

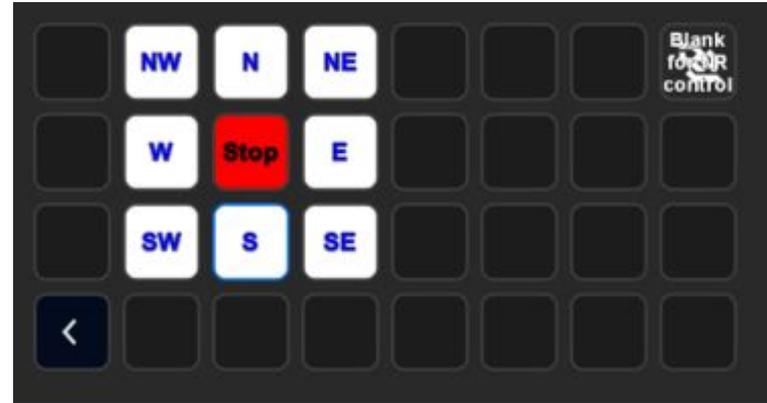
- 6/15/24 button hotkey versions
- Each button is a user defined automated LED screen that can change state
- Buttons can be programmed for one or many actions (hotkeys and macros)
- Can be used with or without Node Red with REST api and web sockets
- Layers of pages, so not limited to 15 buttons



Elgato Stream Deck Examples



Stream Deck Programming Screen





Elgato Stream Deck Examples



Stream Deck Main Screen

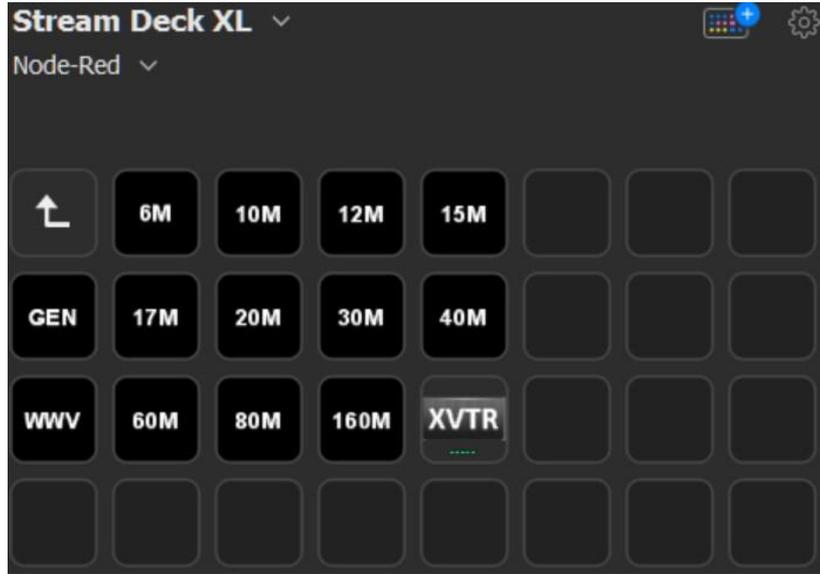


Stream Deck FT8 Screen

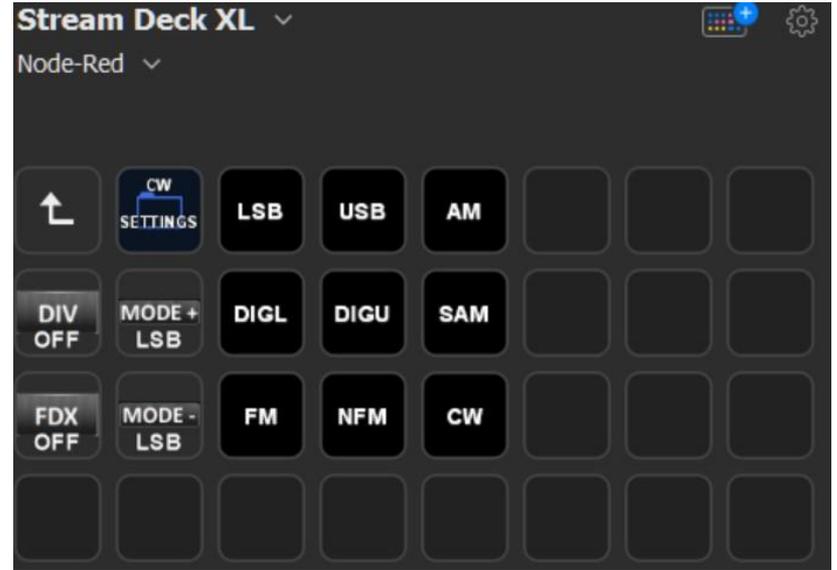




Elgato Stream Deck Examples



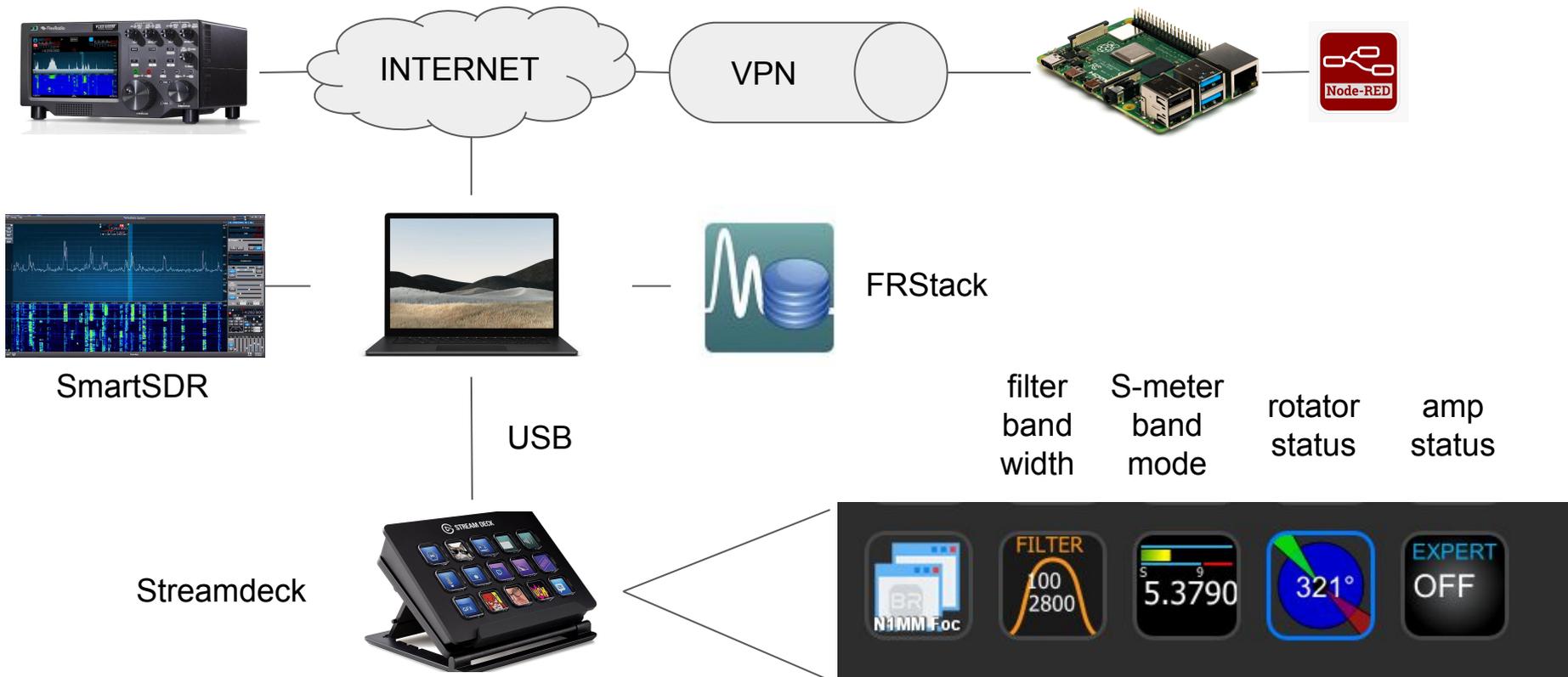
Stream Deck Band Screen



Stream Deck Mode Screen



Elgato Stream Deck Flex Remote





Tools to Automate Your Shack

Elgato Foot Pedal

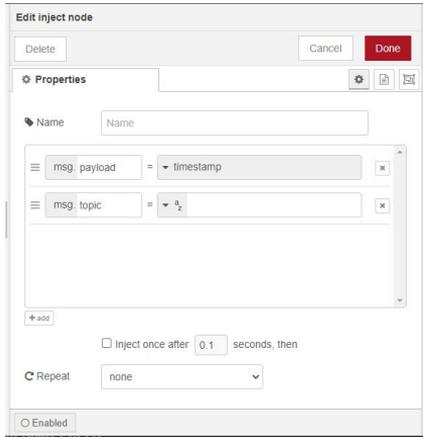


List Price - \$90

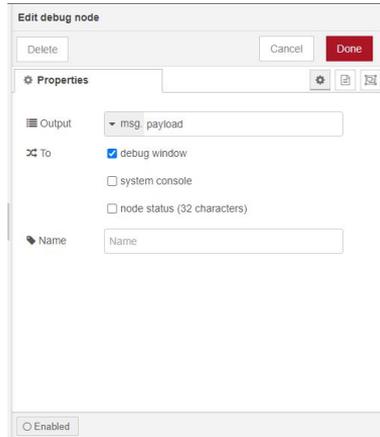
- 3 individual pedals
- Each pedal comes with 4 different tension springs for adjustment
- Pedals can be programmed for one action or many like the Stream Deck
- Middle can be PTT or F1 CQ Send
- Toggle N1MM Entry Window Focus
- Toggle N1MM Transmit Focus



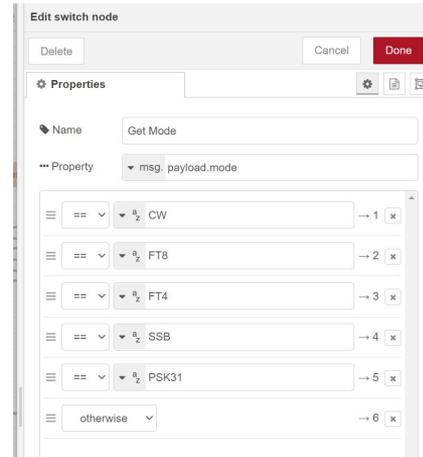
What is a “Node”? Examples



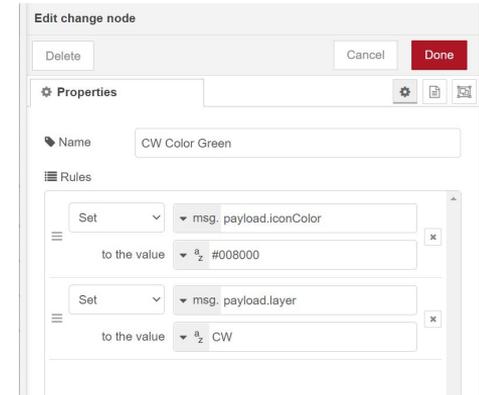
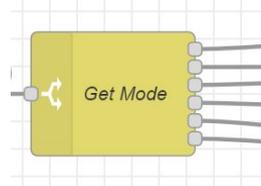
Start a flow or inject a value into a flow



To debug a node or a flow



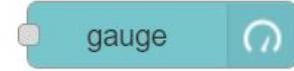
If-Than-Else Routing



Set, Change, Move & Delete payloads



What is a “Dashboard Node”?



Edit text node

Delete Cancel Done

Properties

Group [Configuration & Resets] Q's/Hr Rate C

Size 3 x 1

Label 1Hr Low Rate

Value format {(msg.payload)}

Layout

label value label value label value

label value label value

Class Optional CSS class name(s) for widget

Name Q Low 1 Hour Text

Edit button node

Delete Cancel Done

Properties

Group [Configuration & Resets] Database Reset

Size 6 x 1

Icon optional icon

Label Query All Contests in DB

Tooltip optional tooltip

Color optional text/icon color

Background optional background color

When clicked, send.

Payload timestamp

Topic msg.topic

If msg arrives on input, emulate a button click:

Class Optional CSS class name(s) for widget

Name Query All Contests in DB

Edit gauge node

Delete Cancel Done

Properties

Group [POTA Dashboard] Spots Stats by Mode

Size 4 x 3

Type Gauge

Label SSB Spots

Value format {(msg.payload)}

Units spots

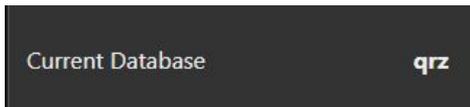
Range min 0 max 100

Colour gradient

Sectors 0 optional optional 100

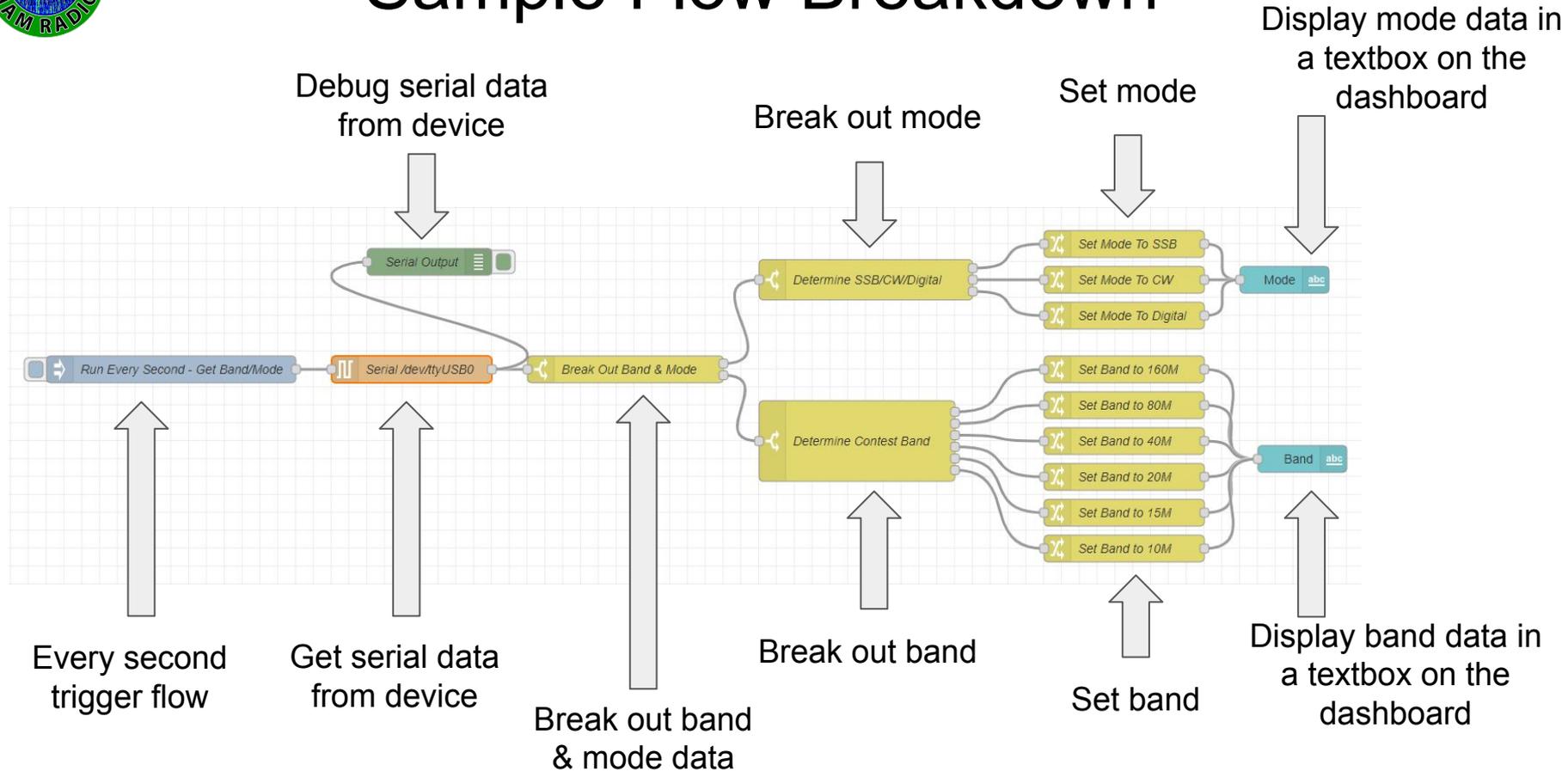
Class Optional CSS class name(s) for widget

Name SSB Spots



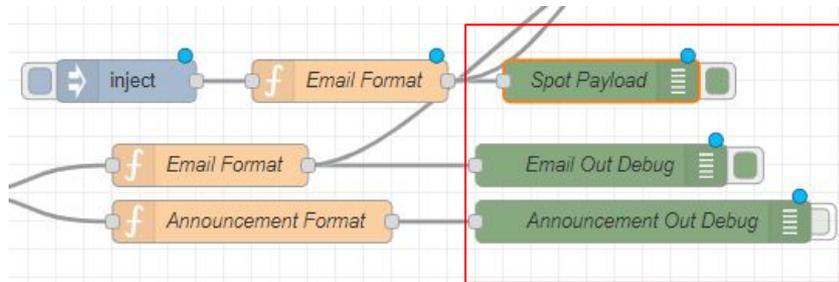
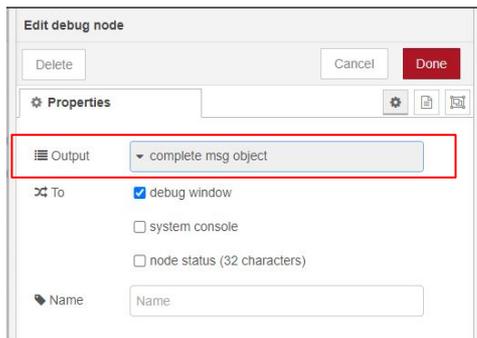


Sample Flow Breakdown





Debugging Flows



- **The debug node will be your most used node - learn how to use it**
 - Rename debug nodes to something useful for locating quickly
 - Change the output to “complete msg object” to see complete debug data
 - Connect debug nodes to everything
 - Make sure you turn them on to see the output
 - You can leave them connected but turn off the output



Where to Start?

<https://nodered.org/>

Documentation



Forums



A screenshot of the Node-RED website homepage. The top navigation bar is dark grey with links for 'home', 'about', 'blog', 'documentation', 'forum', 'flows', and 'github'. The main content area has a dark red background with the text 'Node-RED' in white, followed by 'Low-code programming for event-driven applications' and 'Latest version: v1.3.2 (npm)'. Below this, there is a white section with a description of Node-RED and three buttons: 'Features', 'Get Started', and 'Community'. On the right side of this white section, there is a video player thumbnail for 'Introduction - Node-RED Essentials' with a play button.



Installing Node Red (Windows)

<https://nodered.org/docs/getting-started/windows>

Quick Start

1. Install Node.js
2. Install Node-RED
3. Run Node-RED

Alternative Installations on Windows

npm on Windows

Sharing Node-RED between Users

Installing Node.js Windows Build Tools

Running on Windows

Using PM2

Run Node-RED on Startup

- Install Node.js
 - <https://nodejs.org/en/> (latest version)
- Install Node Red
 - `npm install -g --unsafe-perm node-red`
- Run Node Red
 - `c:>node-red`

Consult the Node Red Windows Install website for additional parameters needed for install and starting Node Red on boot up



Installing Node Red On A Pi

<https://nodered.org/docs/getting-started/raspberrypi>

```
bash <(curl -sL https://raw.githubusercontent.com/node-red/linux-installers/master/deb/update-nodejs-and-nodered)
```



Raspberry Pi 4 (4Gb) - \$55

- 4Gb desktop
- 2Gb no desktop

SD Card (16Gb) - \$10

Power Supply - \$7

Case - \$10

Optional

Mini HDMI cable - \$20

Keyboard - \$10



Enabling SSH & WiFi on RasPi First Boot

<https://www.raspberrypi.org/documentation/remote-access/ssh/README.md>

3. Enable SSH on a headless Raspberry Pi (add file to SD card on another machine)

For headless setup, SSH can be enabled by placing a file named `ssh`, without any extension, onto the boot partition of the SD card from another computer. When the Pi boots, it looks for the `ssh` file. If it is found, SSH is enabled and the file is deleted. The content of the file does not matter; it could contain text, or nothing at all.

If you have loaded Raspberry Pi OS onto a blank SD card, you will have two partitions. The first one, which is the smaller one, is the boot partition. Place the file into this one.

For a headless (no keyboard/mouse/monitor) setup, place a blank file named `ssh` in the root of the SD card after you flash the image. On first boot, SSH will be enabled.

You will need to look at your router to find out what DHCP address the Raspi was configured with.

Use a program like Putty to SSH into your Pi.

<https://www.raspberrypi.org/documentation/configuration/wireless/headless.md>

wpa_supplicant.conf file example:

```
ctrl_interface=DIR=/var/run/wpa_supplicant GROUP=netdev
update_config=1
country=<Insert 2 letter ISO 3166-1 country code here>

network={
    ssid="<Name of your wireless LAN>"
    psk="<Password for your wireless LAN>"
}
```

Create a text file named `wpa_supplicant.conf`

Copy the info to the left & replace your country code (US), SSID and WPA password.

Save in the boot directory of the SD Card

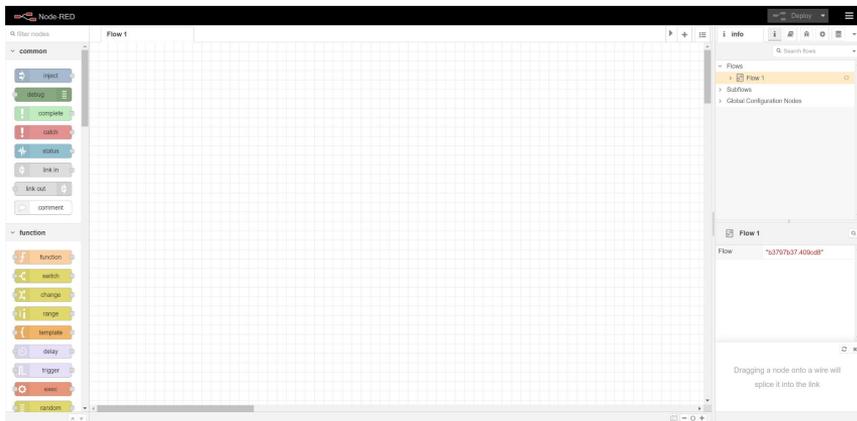


Node Red Main Screens

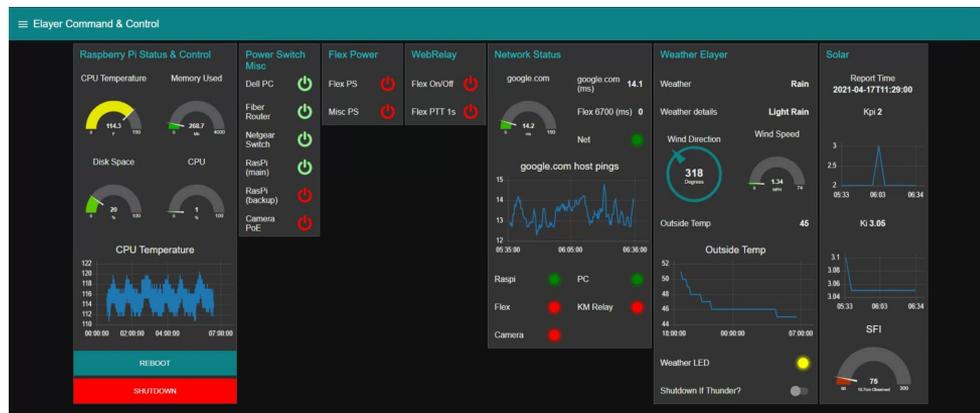
Workspace Webpage : <http://localhost:1880> or <http://<Raspi ip address>:1880>

Dashboard : <http://localhost:1880/ui> or <http://<Raspi ip address>:1880/ui>

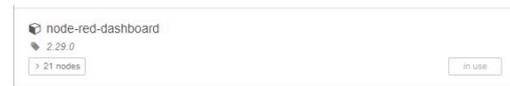
Workspace



Dashboard



- Install the dashboard node to display flows via the dashboard





Node Red Workspace

<http://<ip address of your Node Red install>:1880>

The screenshot shows the Node-RED interface with several red arrows pointing to specific features:

- Workspace Tabs:** Points to the tabs at the top of the workspace, labeled 'Test Data', 'Flow 1', and 'Flow 2'.
- Deploy & Menu:** Points to the top right corner of the interface, where the 'Deploy' button and a hamburger menu icon are located.
- Node Palette:** Points to the left sidebar containing various nodes categorized under 'common' and 'function'.
- Sidebar Menu:** Points to the top right of the right sidebar, where a search bar and a menu icon are located.
- Sidebar:** Points to the main content area of the right sidebar, which displays a list of nodes and their details.
- Main Workspace:** Points to the central grid area where flows are built.

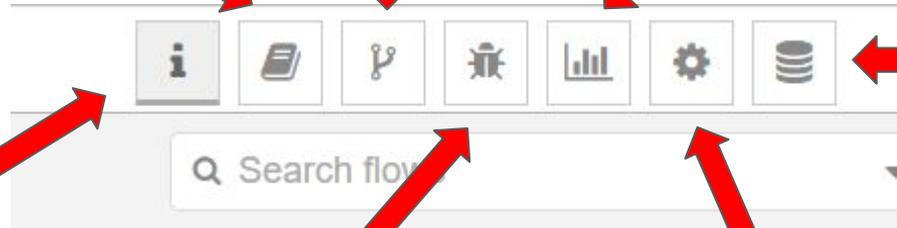


Node Red Sidebar Menu

Help

Git Repository

Dashboard Layout



Local, Flow and
Global Variables

Project Info

Debug

Configuration Node Settings



Pallet Nodes Function vs Dashboard

FUNCTION NODES

- To start a flow
- Connect to a device to receive or push information
- Manipulate data
- Move data forward through the flow, etc...
- Debug

DASHBOARD NODES

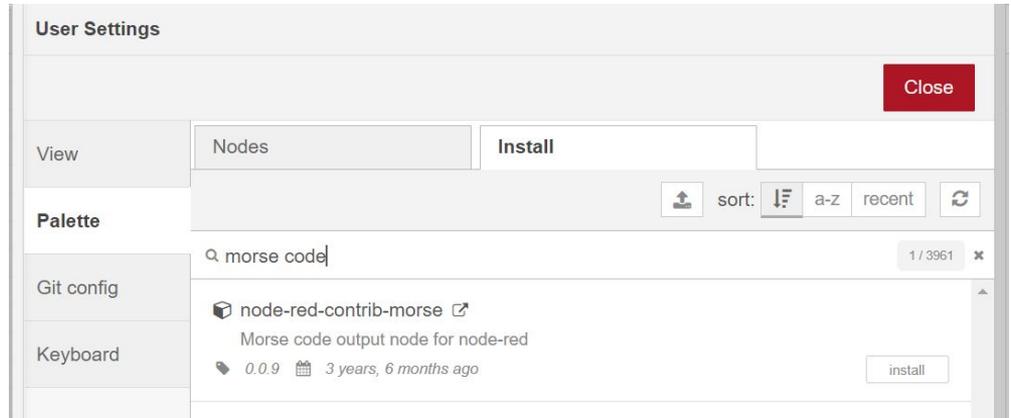
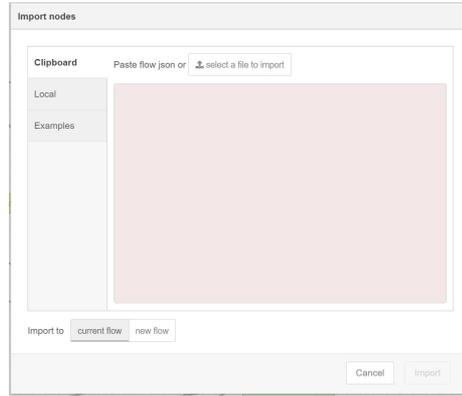
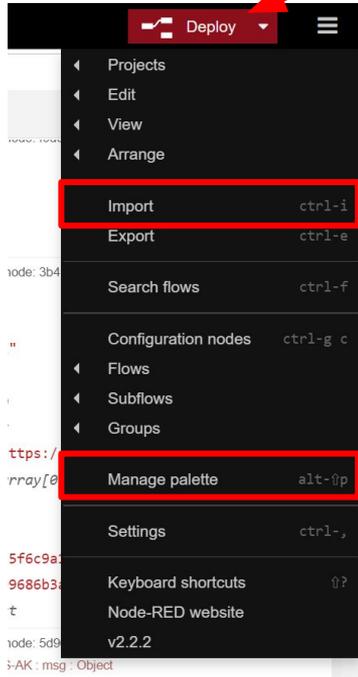
- Nodes to display information on the dashboard





Node Red Menu Deploy & Dropdown

Program Compile





Node Red Workspace

The screenshot displays the Node-RED workspace for a contest dashboard. The interface includes a top navigation bar with tabs for Dashboard, Radio Info, OP Competition, Band Stats, Spectator Dashboard, PI Dashboard, Database, Configuration & Resets, RIN Mapping, Online Scoreboard, Backup Restore, and Toolbar. A left sidebar contains a 'filter nodes' search bar, 'subflows' (1Hr Rate Color, 2Hr Rate Color, Spots Rate, DB Call Lockup), 'common' (inject, debug, complete, catch, status, link in, link call, link out, comment), and 'function' (function, switch, change, range, template, delay, trigger, exec, filter, countdown, counter) categories.

The main workspace features a large flowchart titled 'Dashboard Map, QSO Exchange & Times'. The flow starts with a 'Standard Payload' node leading to a 'DB Call Lockup' node. This connects to a 'Lookup Type' node, which then branches into three main paths: 'LAME - Add Mults - Exchange', 'is running?', and 'is Multibow?'. Each path involves a series of nodes including 'msg.payload', 'inject Home Run D', 'inject Legend D', 'msg.payload', 'msg', 'DB Exchange Color', 'LAME SSP QSO', 'Reset Timer', 'Status D', 'Reset!', 'Start', 'Hourglass', 'Add 0 to Counter', 'Last SSP QSO Time', 'Last Run QSO', and 'Hourglass Error Catch'. The 'is running?' path also includes 'Status D', 'Reset!', 'Start', 'Hourglass', 'Add 0 to Counter', and 'Last Run QSO Time'. The 'is Multibow?' path includes 'Reset Timer', 'Status D', 'Reset!', 'Start', 'Hourglass', 'Add 0 to Counter', and 'Last Mult QSO Time'.

Below the main flowchart are two smaller flowcharts. The first, titled 'LCP Score XLM', processes 'LCP Score XLM' through 'msg.payload', 'Control in Empty', 'if Score is 0', and then branches into 'Total QSO Array Parse', 'Total Multi Array Parse', and 'Total Points Array Parse'. Each branch involves 'msg.payload', 'Color Green', 'Color White', 'Color Yellow', 'Total Score', 'Total QSOs', 'Total Multi', 'Total Points', 'msg.payload', 'Color Green', 'Color White', 'Color Yellow', 'Delay 3s', and 'Color White'. The second flowchart, titled 'LCP Radio Data XLM', processes 'LCP Radio Data XLM' through 'msg.payload', '300 Drop Limit', 'SQL Select Radio 1 Rate', '300 Drop Limit', 'SQL Select Rate', '300 Drop Limit', 'SQL Select Rate', 'SQL Database', 'msg.payload', '1Hr Rate Color', 'DB Laser', and 'Radio 1 QSO Rate'.

On the right side, there is an 'Info' panel showing a search for 'Contest_Dashboard' and a list of flows. Below that is a 'Dashboard' panel showing a search for 'Flow *407d2b7741e67647*'. At the bottom right, there are instructions: 'Show the Info tab with `ctrl+g` or the Debug tab with `ctrl-g`'.

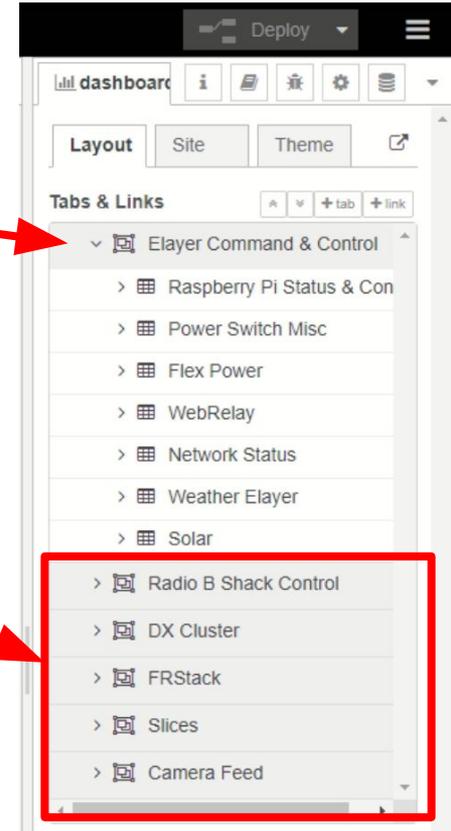
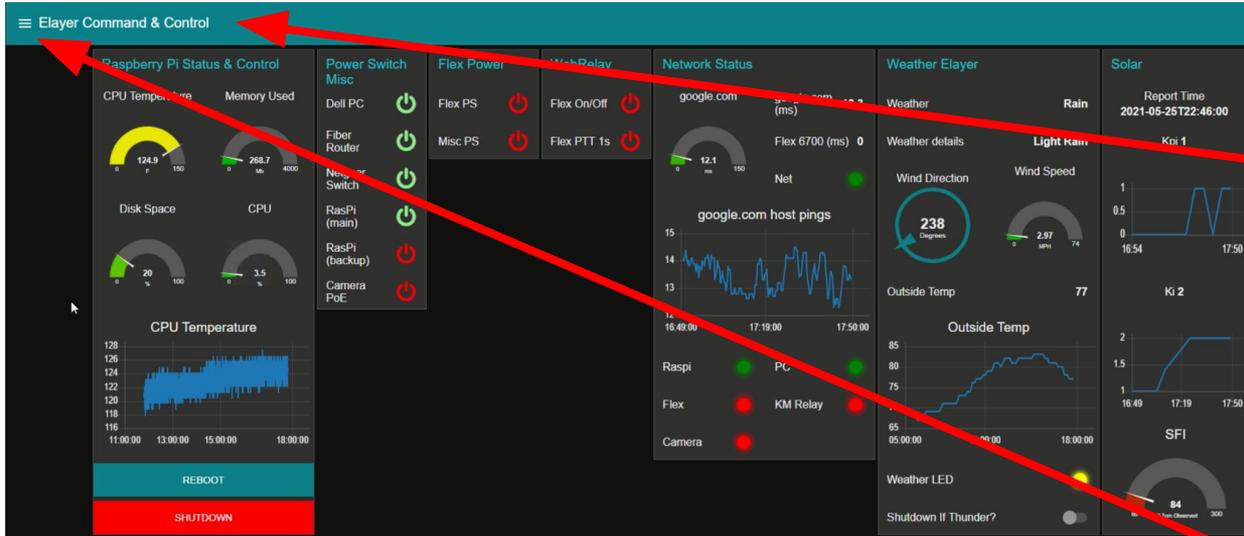


Adding Tabs & Groups

The screenshot displays a dashboard configuration interface. At the top right, there is a red 'Deploy' button and a hamburger menu icon. Below this is a toolbar with several icons: an information icon, a document icon, a link icon, a group icon, a bar chart icon (highlighted with a blue box), a settings gear icon, and a database icon. Underneath the toolbar are three tabs: 'Layout', 'Site', and 'Theme'. The main section is titled 'Tabs & Links' and contains a tree view. At the top right of this section are '+ tab' and '+ link' buttons (both highlighted with red boxes). The tree view shows a root node 'TAB 1 - Top Level' (with a dropdown arrow) which has a '+ group' button (highlighted with a red box) and 'edit' and 'layout' buttons (the latter highlighted with a green box). Below 'TAB 1' is a sub-node 'GROUP 1 - Group of Nodes within a TAB'.



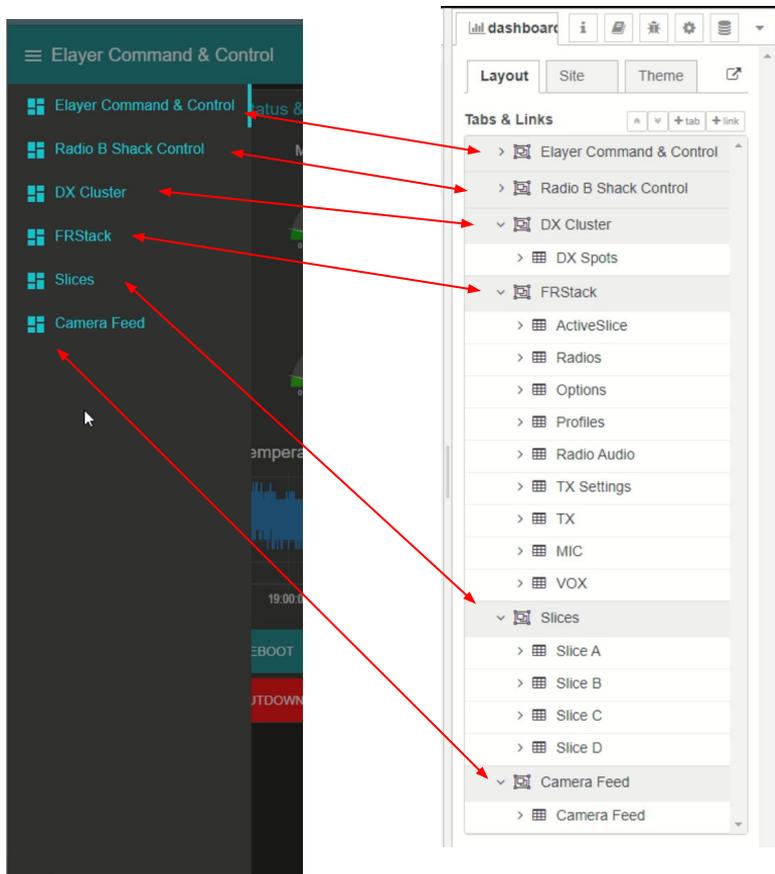
Dashboard Tabs



- By default additional tabs are located under the dashboard hamburger menu



Additional Tabs



- Click on the hamburger menu on the dashboard to see additional tabs
- Each tab is listed under the hamburger menu automatically
- You can choose the display icon
 - You can choose an icon from Font Awesome library



Dashboard Tabs & Groups

Node-RED Dashboard layout editor: Elayer Command & Control

Cancel Done

Layout Site Theme

Tabs & Links

- Elayer Command & Control
 - Raspberry PI Status & Control
 - Power Switch Misc
 - Flex Power
 - WebRelay
 - Network Status
 - Weather Elayer
- Radio B Shack Control
 - Flex Radio
 - Numbered Meters
 - Gauge Meters
- DX Cluster
 - DX Spots
- FRStack
 - ActiveSlice
 - Radios
 - Options
 - Profiles
 - Radio Audio
 - TX Settings
 - TX
 - MIC
 - VOX

Raspberry PI Status & Control (Width: 6)

- CPU Temperature gauge
- Memory Used gauge
- IP Address text
- Disk Space gauge
- CPU gauge
- CPU Temperature chart
- Reboot button
- Shutdown button

Power Switch Misc (Width: 3)

- Dell PC Outlet 3 switch
- Fiber Router Outlet switch
- Netgear Switch 0 switch
- Node Red RasPi switch
- Node Red RasPi switch
- Camera PoE Outlet switch

Flex Power (Width: 3)

- Flex PS Outlet 1 switch
- Misc PS Outlet 2 switch

WebRelay (Width: 3)

- KMtronic 1 Flex switch
- KMtronic 2 switch
- KMtronic 3 switch
- KMtronic 4 switch
- KMtronic 5 switch
- KMtronic 6 switch
- KMtronic 7 switch
- KMTronic 8 Flex switch

Network Status (Width: 6)

- google.com gauge
- google.com Ping text
- Flex 6700 (ms) text
- Internet Indicator led
- google.com Chart chart
- Raspi Indicator Light led
- PC Indicator Light led
- Flex Indicator Light led
- KM Relay Indicator led
- Camera Indicator led

Weather Elayer (Width: 6)

- Weather text
- Weather details text
- Wind Direction gauge
- Wind Speed gauge
- Outside Temp text
- Outside Temp chart
- Weather Alert LED led
- Shutdown If Thunder? switch

Solar (Width: 4)

- Report Time text
- Kpi



Side by Side Dashboard Groups

Raspberry Pi Status & Control

CPU Temperature: 124.9 F

Memory Used: 268.7 Mb

Disk Space: 20 %

CPU: 3.5 %

CPU Temperature chart

REBOOT

SHUTDOWN

Raspberry Pi Status & Control

Width: 6

CPU Temperature gauge	Memory Used gauge
Disk Space gauge	CPU gauge
CPU Temperature chart	
Reboot button	
Shutdown button	

Weather Elayer

Weather: Clouds

Weather details: Overcast Clouds

Wind Direction: 23 Degrees

Wind Speed: 4.35 MPH

Outside Temp: 49

Outside Temp chart

Weather LED:

Shutdown If Thunder?:

Weather Elayer

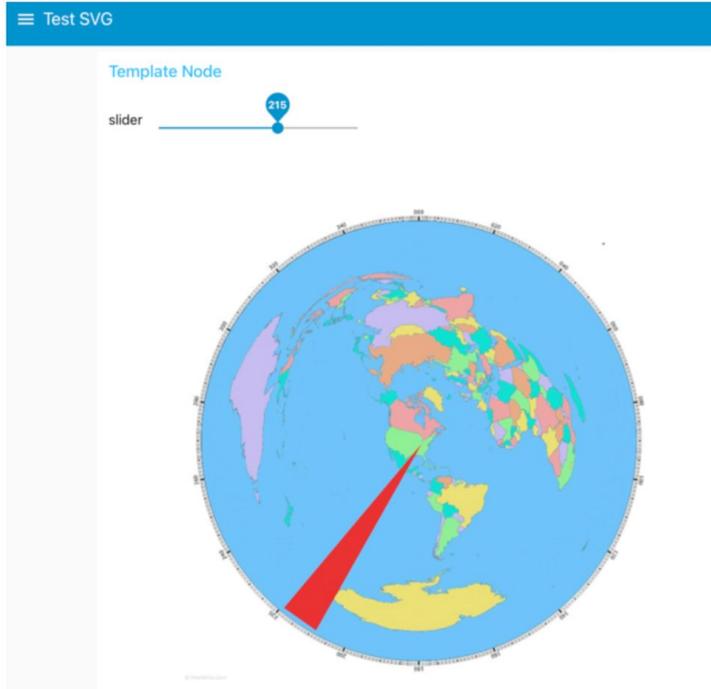
Width: 6

Weather text	
Weather details text	
Wind Direction gauge	Wind Speed gauge
Outside Temp text	
Outside Temp chart	
Weather Alert LED led	
Shutdown If Thunder? switch	

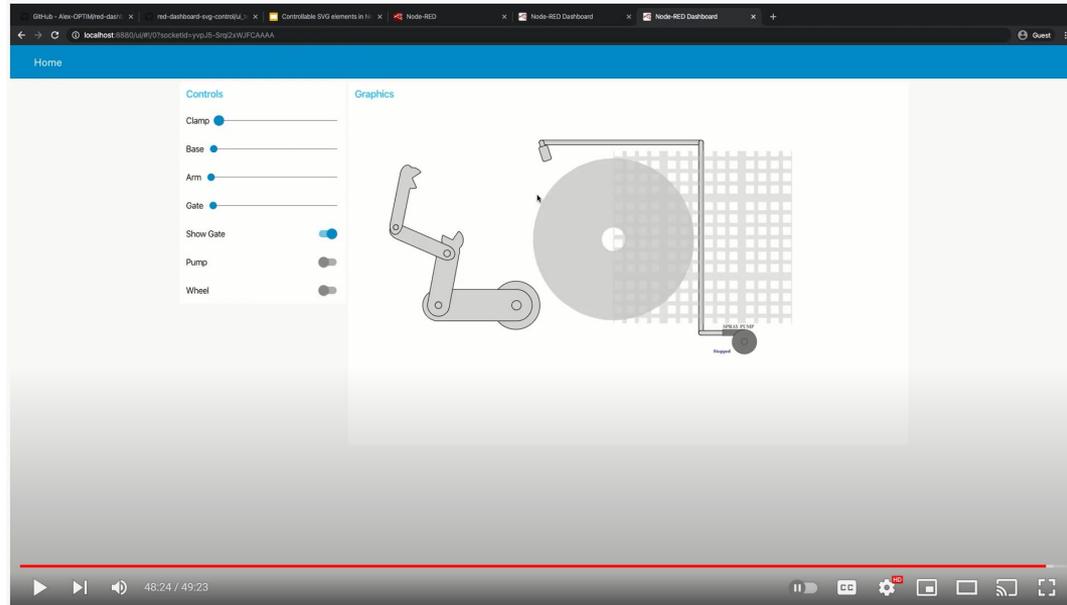


Node Red Dashboard SVG Elements

Interactive Rotator Map



YT : Example of controllable SVG elements

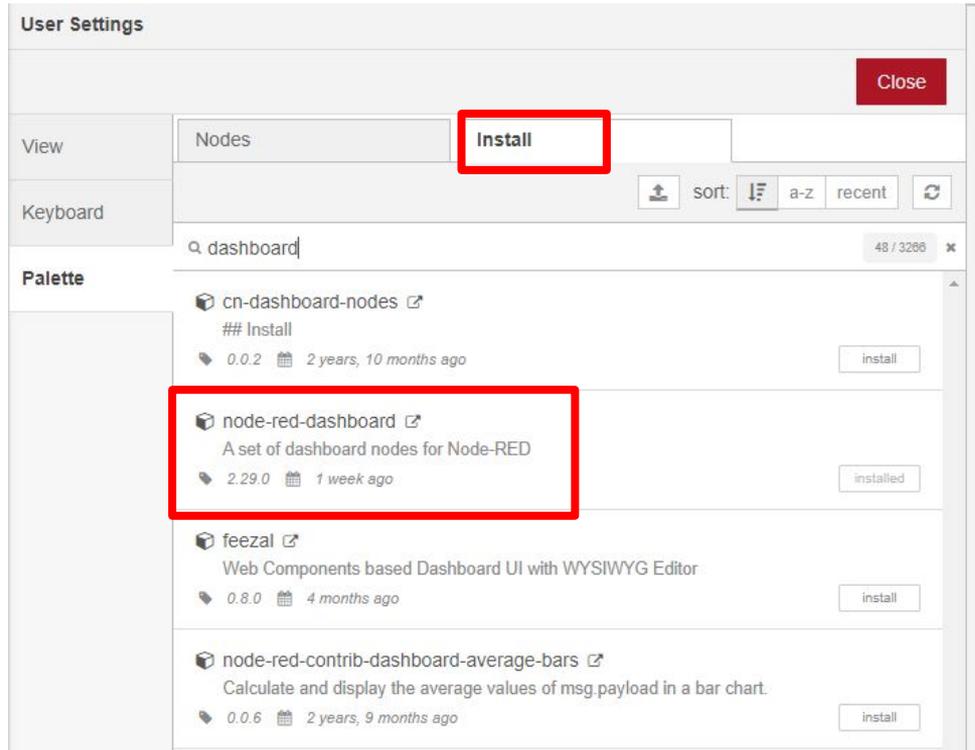
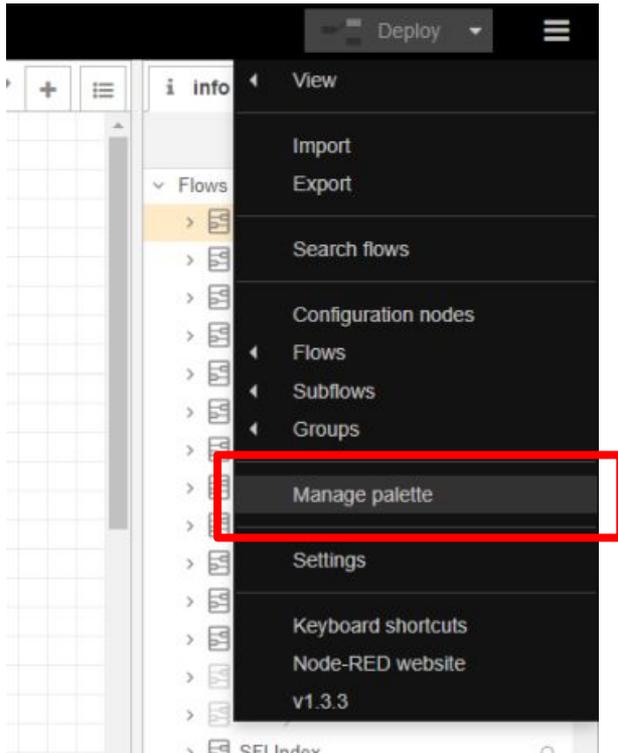


Make your own controllable SVG elements
with automation



Node Red First “To Do”

<http://<ip address of your Node Red install>:1880>





Resources

- Node Red Website, Examples, Cookbooks & Forums
 - <https://nodered.org/>
- Node Red YouTube Page
 - <https://www.youtube.com/channel/UCQaB8NXBEPod7Ab8PPCLLAA>
 - Getting Started Playlist
- Opto Video (industrial automation, but good info)
 - <https://www.youtube.com/channel/UCu4VaBjPynEA8mn9Gf2KKYQ>
- Node Red on Reddit
 - <https://www.reddit.com/r/nodered/>

Groups I/O Node Red for Ham Radio

<https://groups.io/g/nodered-hamradio>

Examples, Ready to Load Flows, Mailing List, Getting Started



Node Red Pre-Programmed Flows

Groups.io Your Groups Find or Create a Group Help Kyle K

Home Subscription Messages Hashtags New Topic Chats Directory Calendar Photos **Files** Databases Wiki

nodered-hamradio@groups.io Files Search

+ New

Name	Type	Uploaded By	Size	Uploaded
AB6A Flows - MacDoppler, MacLogger, Gemini HF1K and More... (11)	Folder	-	-	Feb 16
I wrote a python script last year to take Mac Doppler UDP Rotator output and send to a Goto telescope mount. It works great but now I want to rewrite in Node-Red. Original code here: https://github.com/djsincla/goto Associated with this are other flows I am working on.				
Array Solutions Stack Match With REST Commands (4)	Folder	-	-	Jan 25
Node-Red Flow to control five relays per the logic given by Scott, W5WZ, to control an Array Solutions Stack Match. May be controlled via Dashboard buttons or via REST commands. The folder includes the Node-Red flow, a StreamDeck Profile to build each button in your StreamDeck, and the Stack Match Logic Documentation.				
Community Project - Multi-Operator TX Control for Jeff (1)	Folder	-	-	Mar 7
Folder to hold various ideas for a WAN/LAN based multi-operator TX Control System				
DJ2VA Flows Yaesu GS232, Amplitec antenna switch (2)	Folder	-	-	Mar 26
Several flows for YAESU GS232 Rotator control, Amplitec remote antenna switch				
Extra Class Frequency Alarm and TX Inhibit (3)	Folder	-	-	10/20/20
Node-Red Flow to monitor Flex VFO Frequency for entry into Extra Class Frequency spectrum. When Extra Class Spectrum is entered the flow will: 1- Inhibit Flex TX, 2- Sound an audio Alarm, 3- Show an Alarm Flag for ten seconds on the Dashboard, and 4- Change the background color of a dashboard tile to red. When VFO frequency is returned to General Class Frequency Spectrum, TX Inhibit is turned off, a "General" alarm flag is shown for ten seconds, and the tile background changes to green				
Flex Server Power Sequencer (2)	Folder	-	-	10/04/20
Node-Red Flow "Pings" the Flex Server to determine the current state and then sets up the correct sequence to either startup or shutdown the Server with the next button push. The current Flex Server State is indicated by changing the background color and text of the sequencer button. "Boot Relay" and "Power Relay" status indication tiles show the sequencer in motion. A two-minute countdown timer is provided for reference. The flow provides Boolean outputs (true/false) for the user to wire into their specific relay control application. Two files are included in this folder, the Node-Red flow, and instructions.				
Flex TX Power Limiter, By Band (4)	Folder	-	-	10/10/20
Node-Red flow to provide three ranges, High, Medium, and Low, of TX Power Limit. Uses PG-XL amp mode status and Flex Server Frequency as inputs. Three files, including "Band Plan", "Band Send", and Instructions. Uses FRStack to input necessary variables. (WA9WUD FRS Files) The user can enter power limit values for each band and for each range. The power limiter has an on/off button along with mode input from the PG-XL amp to allow the limiter to control the Flex TX Power when the PG-XL is in "Operate and no limit with PG-XL in "Standby. Works along with the FRStack PG-XL in Operate Power Limit feature. (if you do this, be sure the FRS setting is set above the Node-Red Power Limiter settings. If Flex TX power is less then the Power Limiter, the Flex TX power will be used. Does not integrate with SPE2K amp power limiter. Perhaps in the future.				
G1FHY (2)	Folder	-	-	Mar 16
My node red flows				



Pre-Programmed Flows

- Alpha 87A
- KAT500
- KPA1500
- SPE Amps
- PG_XL
- RFKit 2KS
- 403A Station Genius
- Amplitec SW3000
- Array Solutions Stack Match
- GHE Antenna Switch
- Hamnation Antenna Switches
- RCS-4 Antenna Switch
- SteppIR
- WSJTX-Alerts
- Streamdeck
- Spotting to Maps
- Solar Data
- Lightning Detector
- Flex Radio
- Hamlib Flows
- IC7100
- Icom CIV
- Kenwood TS890
- Kenwood TS990
- Xeigu
- DLI Web Relay
- KMTronics Relays
- 403A Rotor Genius
- EA4TX Remote Box
- HyGain Rotor-EZ
- PST Rotator
- Yaesu GS232 Rotator
- HF Auto Tuner
- KAT500
- Tuner Genius
- Alpha 4510 SWR Meter
- Elecraft W2
- LP-100A
- LP-500
- Power Meter II
- LDG Tuners
- Satellite PC flows
- Wave Node Meter
- POTA Spotter
- Contesting Dashboard



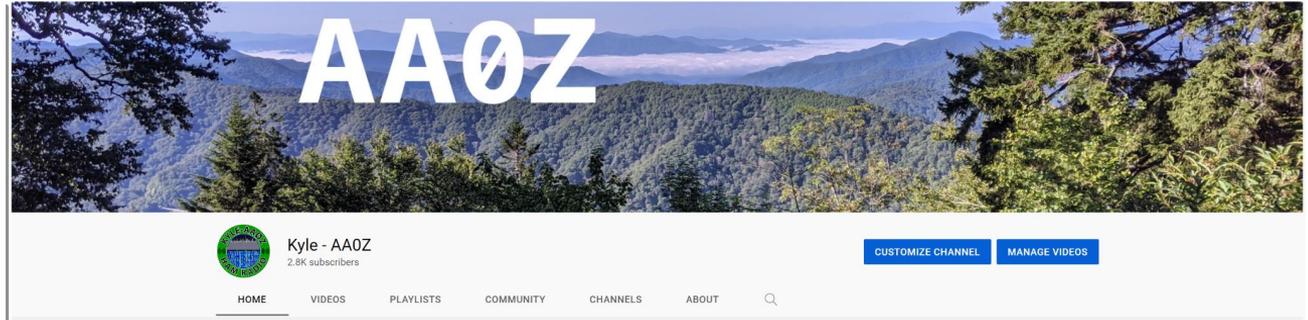
What's Next? - Call to Action

- **Join the Groups.IO mailing list (search Node Red Ham Radio Groups I/O)**
- Install Node Red and get it up and running
- Install additional nodes in the pallet
- Configure and deploy your first flow
- Start small (timestamp and debug), learn what it's doing
- Learn how to use the debug node (it's your best friend)
- Load an existing flow and deploy
- Program a flow for your radio or ham radio peripheral
- Share your flow on Groups.IO





Node Red YouTube Playlist



The screenshot shows a YouTube playlist page. On the left, the playlist title is 'Node Red Training Series' with a 'PLAY ALL' button. Below the title, it says '6 videos • 465 views • Last updated on Mar 17, 2022'. The video list includes:

- Node-Red - Raspberry Pi Prep Work (1:06:41)
- Node-Red - Installing Node Red On A Raspberry Pi (1:05:13)
- Node-Red - Your First Flow! Installing Nodes and Importing Flows Too!! (1:15:52)
- Node-Red - Digital Loggers Web Power Switch Pro Flow Explained! (1:11:25)
- Node-Red - Common Nodes Explained! (1:06:00)
- Node-Red - Questions & Answers and Misc Flows (1:03:57)

On the right side of the screenshot, there is a 'SORT' dropdown menu.



WO2X StreamDeck Video





Thank You

Questions?

A copy of this presentation available on request!